

## ABSTRACT

The invention provides a welding system capable of freely controlling the dispersion and concentration of arc heat over the groove face with an extremely narrow gap and a high strength and high quality welded joint structure which is formed by this welding system and which is capable of preventing softening/hardening of the structure, the lowering of the toughness thereof and the generation of a crack. According to the welding system, the melting rate of a welding wire is controlled relative to the welding wire feeding rate by changing the characteristic of an arc current so that the range of behavior and the transfer rate of the arc pole (the arc generating main point at a groove surface) are controlled. Further, the welded joint structure consists of a high strength steel having a superfine grain structure with a carbon equivalent of as low as less than 0.38 and a crystal grain size of less than 7  $\mu\text{m}$  and is welded by a consumable electrode type arc welding method so as to control the arc heat distribution on the groove face of the joint.